Shropshire Botanical Society Newsletter, Spring 2014

Dryopteris filix-mas (Male Fern), photo by Dan Wrench, 2013.

Shropshire Botanical Society Newsletter No.28

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Past copies of the newsletter are available as pdfs from the Shropshire Botanical Society website: http://www.bsbi.org.uk/shropshire.html

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Society Matters Mags Cousins

We have a varied selection of articles in this newsletter to reignite your interest in the world of botany after a wash out winter. The delights of Jones's Rough reserve in spring should be enough to tempt you outdoors. We also have an update on Clarepool Moss SSSI and the last in the series on the identification of Sphagna, this time the red ones.

Remember the new updated Flora of Shropshire will soon be available so please contact Sue (sue.t@field-studies-council.org) to place your pre-publication order: £25 to members or a special offer of £30 to include Rare Plants of Shropshire and The Ecological Flora of Shropshire, not including postage!. The books can be collected at Society meetings or posted at cost by arrangement.

Hope to see you soon, either at one of the field outings planned this year to some fabulous sites, or at our forthcoming spring meeting.

Spring Meeting and AGM Saturday 12th April 2014, 2-4 pm, at the Shropshire Wildlife Trust, 193 Abbey Foregate, Shrewsbury, SY2 6AH.

NOTE CHANGE OF VENUE

We will be meeting for the usual AGM business, where the only election necessary is for the chair of the Society. We would love Ian Trueman to stay on but if there are any other willing volunteers please contact the current Secretary with the name of the proposed! Following the business, instead of our usual recipe with a guest speaker we are pleased to present:

"What's so Hard About Ferns?"

This will be a slide talk and ferns ID taster session as a precursor to establishing a Ferns Study Group. We are lucky to have Sarah Whild and Mark Duffell, amongst others to lead us through this attractive group which have an unfounded reputation for being difficult!

Extras

Saturday 1st Nov., 2014 10.30-16.00pm, Preston Montford *Polypodium* workshop
First in the fern series for a Fern Study Group, a gentle look at the differences between the main species and more common hybrids of *Polypodium*. All in the lab so no field kit required but bring a packed lunch. Mystery specimens welcome. We will have a limit of 16 students to allow for plenty of lab space. Contact Martin Godfrey on email: martinandrosie@aol.com.

Field Meetings Programme 2014

Everyone is welcome, an appreciation of plants and sensible outdoor gear and packed lunch is all that is required. It is a good idea to check in with the leader beforehand to make sure that the day will be going ahead as planned and some visits require pre booking.

Saturday 17th May 11:00am. Granville Country Park and Muxton Marsh SSSI.
A look at the grassland sites managed by Shropshire Widlife Trust. The meeting point is the main car park for Granville Country Park, take Granville Road off the roundabout by Asda on A4640 and continue till nearly the end - car park is on the left just before the Golf Club. Postcode TF2 8PQ. Grid Ref. SJ719132.
Contact Penny Wysome: pennywysome@yahoo.com, or Tel. 01952 242617.

Saturday 7th June 11:00am. Bury Ditches.
Training and recording visit to Bury Ditches forestry, heath and grassland with the ramparts of a large Iron Age hillfort at its summit. Rare Wood White butterfly as well as *Vicia sylvatica* Wood Vetch, *Gymnocarpium dryopteris* Oak Fern and *Clinopodium vulgare* Wild Basil. Access is easy, mostly forestry tracks. Meet at the Forestry car park: Grid Ref. SO334839.
Contact Fiona Gomersall: fiona@eadstudio4.co.uk, or Tel. 07506 120019.

Saturday 28th June 11:00am. Glopa, near Oswestry.
Training and recording visit to Glopa, a series of fields with wetlands, a pond and a dry bank. A remarkable 20 axiophytes have been recorded over the years. Species to look out for include *Salix repens* Creeping Willow and *Triglochin palustris* Marsh Arrowgrass. Access is easy. Meet in the long layby at side of the road just north of a dog-leg crossroads on B4580 (near postcode SY10 7PP). Grid Ref. SJ258311.
Contact Chris Walker: candawalker@btopenworld.com

Sunday 6th July 10:30am. Brook Vessons, near the Stiperstones.
Training session on Sedges and their allies. It is a chance to become familiar with some of the acid dwelling and woodland edge species including *Carex binervis* Green-veined Sedge, *C. hostiana* Tawny Sedge, *C. laevigata* Smooth-stalked Sedge and *C. leporina* Oval Sedge. Brook Vessons is a SWT nature reserve on the edge of the Stiperstones National Nature Reserve. Expected distance is not great, but going may be rough and very wet in places. If you have a copy of the BSBI Sedge Handbook please bring it along. For car parking location and booking, please contact Mark Duffell: ms.duffell@btinternet.com, or Tel. 01743 851084.

Saturday 30th August 11:00am. Willey Ponds, Broseley.
Training and recording meeting focusing on the aquatic and marginal plants such as *Ranunculus circinatus* Fan-leaved Water-crowfoot, *Schoenoplectus lacustris* Common Club-rush, and *Veronica catenata* Pink Water-speedwell. It is hoped we can re-find *Hippuris vulgaris* Mare's-tail which hasn't been seen in the county for 32 years. Access is likely to be moderate difficulty in terms of getting to the aquatic species. We are limited to 14 people. Please book early to reserve a place and find out where to meet.
Contact John Handley: johnhandley11@gmail.com, or Tel. 0797 709 5124.

Jones's Rough through the Seasons

Ruth Dawes

Jones's Rough is an old eight acre wood on the outskirts of the village of Nantmawr, south west of Oswestry. A family named Jones lived in a nearby cottage from the 1860s until the 1970s and this was their rough piece of woodland on the edge of their steep smallholding. It is now owned and managed by Shropshire Wildlife Trust.

The wood is wonderfully cool and shady even in the summer due to the unusually high number of Yew trees, *Taxus baccata*, mixed with Wild Cherry, *Prunus avium*, and Hazel, *Corylus avellana*. All survive with their roots in Carboniferous limestone rock on a dry slope.

The first plants of the year to look out for are the shrub, Spurge Laurel, *Daphne laureola*, and Stinking Hellebore, *Helleborus foetidus*, both with green flowers. A careful search in the buds of the Spurge Laurel in January may reveal ladybirds hibernating. The Stinking Hellebore is separated from its close relative, Green Hellebore, by its more bell shaped green sepals, often with purple edges. They are equally at home here in moderate shade and out in long abandoned cottage gardens on the nearby Moelydd Hill, probably taken there from the wood by the cottagers.

The leaves of Sanicle, *Sanicula europaea*, soon follow, together with the tight buds of this unusual member of the umbellifers. They can be found near the steep path in amongst the Common Dog-violets, *Viola riviniana*.

Summer is the time to inspect the ankle twisting rocks of the scree slopes for carpets of yellow Common Rock-rose, *Helianthemum nummularium*. Dwarfed plants of Herb Robert, *Geranium robertianum*, Red Campion, *Silene dioica* and Wild Thyme, *Thymus polytrichus*, also grow here, making a colourful display. At the top of the scree grows a small patch of the locally uncommon Dyer's Greenweed, *Genista tinctoria*. The very rare sub species of Limestone Prickly Sedge, *Carex muricata muricata*, was identified here and on the Moelydd by Sarah Whild in the late 1990s. Another nationally uncommon plant to look out for on the scree in late summer is the Red Hemp-nettle, *Galeopsis angustifolia*, an elegant colourful narrow leaved example of this genus.

Members of the orchid family can be spotted in the wood, including Common Twayblade, *Neottia ovata*, Greater Butterfly, *Platanthera chlorantha* and Broad-leaved Helleborine, *Epipactis helleborine*, all of which can tolerate the shade. Sadly the Frog Orchids, *Coeloglossum viride*, that once grew here by the track were dispatched during improvements to Offa's Dyke Path in the 1980s. However, I no longer slide down this steep path on my back in wet and muddy weather so the improvements are welcome.

Jones's Rough forms part of the important butterfly habitat in the Oswestry uplands, where species such as Pearl Bordered and Small Pearl-bordered Fritillary and Dingy and Grizzled Skippers can be found. Management takes account of the fritillary butterflies as well as plants.

Autumn and winter is work party time to keep open areas. In addition to man power, there is a small flock of hardy black fleeced Hebridean sheep on the reserve, recently joined by three rare breed Castlemilk Moorits, which help to keep the more dominant vegetation down. Well worth a visit for the wonderful views too.

Helleborus foetidus, Stinking Hellebore at Jones's Rough, Photo by Ruth Dawes

H21 *Calluna vulgaris - Vaccinium myrtillus - Sphagnum capillifolium* on the Long Mynd

Tom Holland

Walking through the fog on the Long Mynd last week made me think how staying wet is not altogether to do with rainfall. On the steep north-facing slopes of the Long Mynd batches it's probably lack of direct sunshine (insolation) rather than fog that helps keep things wetter than elsewhere, but whatever the water supply, these slopes retain so much more humidity than similar slopes with a different aspect that they are able to support the sometimes bryophyte-rich H21 *Calluna vulgaris - Vaccinium myrtillus - Sphagnum capillifolium* heath (as opposed to the more typical heath communities of the Long Mynd: H12 *Calluna vulgaris - Vaccinium myrtillus* and H8 *Calluna vulgaris - Ulex gallii*).

Many of these humid steep north-facing slopes of the Long Mynd have a canopy of bracken, heather and bilberry over a continuous and thick bryophyte cover comprised of *Sphagnum quinquefarium*, *Sphagnum sub-nitens*, *Sphagnum capillifolium*, *Hylocomnium splendens*, *Pleurozium schreberi*, *Plagiothecium undulatum*, *Rhytidiadelphus loreus*, *Dicranum scoparium* and *Dicranum majus* along with a sparse cover of grasses, wood-rushes, ferns and forbs (usually WavyHair-grass *Deschampsia flexuosa*, Tormentil *Potentilla erecta*, Hard-fern *Blechnum spicant*, Wood-sorrel *Oxalis acetosella*, Heath Bedstraw *Galium saxatile* and Broad buckler-fern *Dryopteris dilatata*). This matches Rodwell's (Rodwell, 1991) description of H21a, the *Calluna-Pteridium* sub-community. Analysis of species lists collected by me, using the computer programme MATCH, supports the identification (giving a similarity coefficient of around 68% which is higher than coefficients for any other community – see Table 1.). In a number of places where the dwarf shrub layer has almost disappeared the bryophyte community persists below a canopy of bracken (see Fig 2.).

Fig 1. Dwarf shrubs present

Fig 2. Dwarf shrubs absent, Bryophyte layer persists below Bracken

On the Long Mynd, the community seems to occur on the sort of topography, described as typical for the community by Rodwell (very steep slopes of 35-50^0 and an aspect ranging between north-north-west and north-east at an altitude of between 320 – 360m). However, rainfall on the Long Mynd (averaging 900-950mm of rain a year) is a lot lower than that reported by Rodwell (averaging 1600-3200mm of rain per year).

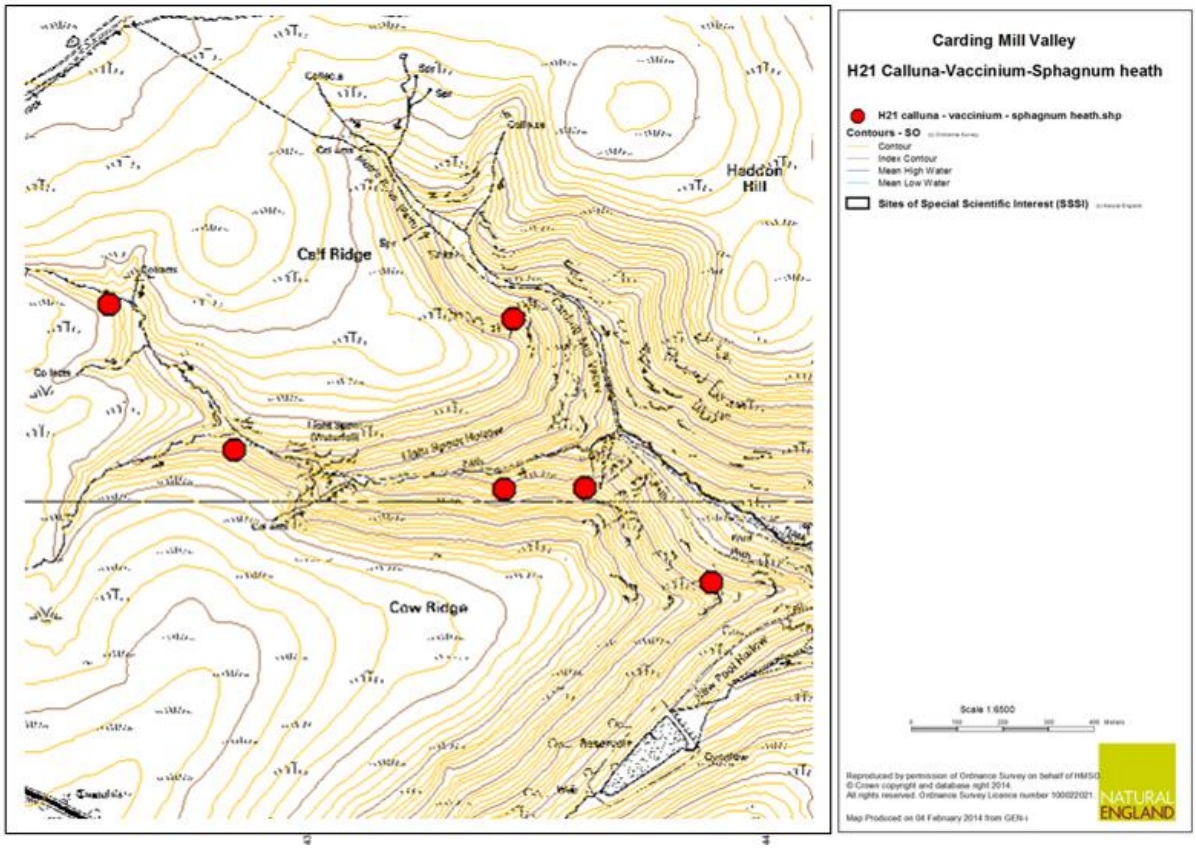

Fig 3. Location of H21 quadrats Carding Mill Valley, Long Mynd.

At first I thought this occurrence of H21 was very exciting because Rodwell says 'the community occurs widely but locally through the north-west Highlands and on Skye with outlying localities on Orkney, in south-west Scotland and the Lake District'. I think I might of imagined the Long Mynd's H21 as a glacial relict showing a disjunct distribution with no other examples between here and the Lakes. However, I now know that the distribution is not disjunct. Instead a string of H21a sites link Shropshire with the Lake District through Derbyshire's Dark Peak and Yorkshire's North Pennines.

Rodwell's idea of H21 is taken from McVean and Ratcliffe's *Vaccineto-Callunetum hepaticosum* (described in their classic 1962 HMSO monograph Plant communities of the Scottish Highlands). Rodwell's comments about community distribution seem also to be taken from the same work. However, McVean's and Ratcliffe's community is only synonymous with Rodwell's H21b, the liverwort-rich *Mastigophora-Herbertus aduncus* sub-community. Rodwell has broadened the community concept (to include impoverished versions of the *Vaccineto-Callunetum hepaticosum*, that lack the hepatic mat) without broadening the distribution.

Broadening the community concept makes sense for a National Vegetation Classification. .As McVean and Ratcliffe say in their introduction 'as work progressed it became increasingly apparent that variation in Highland vegetation is virtually continuous. A gradual spatial change is common and even where there are fairly sharp discontinuities locally, it is usually possible to find a complete series of intermediates to link any two related types, if a wider area is examined'. Except for the NVC this continuous variation continues beyond the Highlands into the rest of the UK.

Broadening the community definition alerts us to the connections that link our vegetation to the more exotic oceanic vegetation of north-west Britain: vegetation that we might otherwise ignore. Both the similarities and the differences between H21a and McVean and Ratcliffe's *Vaccineto-Callunetum hepaticosum* (H21b) are strong and clear. Both H21a and H21b are found on the same sort of highly distinctive topography and habitat and both have a distinctive suite of calcifugous heathland/woodland mosses (*Sphagnum quinquefarium, Sphagnum sub-nitens, Sphagnum capillifolium, Hylocomnium splendens, Pleurozium schreberi, Plagiothecium undulatum, Rhytidiadelphus loreus, Dicranum scoparium and Dicranum majus*) that creates a strong link between the two sub-communities and separates the community from other heathland types. The clear difference between the two sub-communities is the presence in H21b of the hepatic mat (comprised of *Anastrepta orcadensis, Anastrophyllum donnianum, Bazzania tricrenata, B. pearsonii, Herbertus aduncus, Plagiochila carringtonii., Lepidozia pearsonii, Mastigophora woodsii, Pleurozia purpurea, S. nimbosa, S. ornithopodioides* and *Mylia taylori*) and its absence in H21a.

H21 appears to be a well-defined and cohesive plant community, consistent in its floristics, easy to recognise and with tightly defined environmental variables, e.g. topogography, shading, wetness. H21b is even more well defined. Whether a plant community is well-defined (or natural) or ill-defined (or artificial) can be judged by the proportion of its constant species relative to its total diversity. So a well defined plant community like H21 has 12 constant species (or 15%) out of total diversity of

80 (plant species recorded in that community). Twenty nine percent of the species recorded in H21b are constants, suggesting it is even better defined, even more natural, with even more precisely assigned environmental variables. In contrast M22 *Juncus subnodulosus-Cirsium palustre* mire, which is recognised to be a bit of a loose and ill-defined community, only has 6% of its recorded species as constants. Many of the swamp communities are even more ill-defined – for example only 2% of the species recorded in S5 *Glyceria maxima* swamp are constant. An alternative test is to look at the plant community's plot on a Detrended Correspondence Analysis co-ordination graph. A well-defined community will form tight, discrete clusters with little overlap with other communities. An ill-defined community will form large spread-out clusters that overlap a lot with other communities.

McVean and Ratcliffe do mention the impoverished versions of the *Vaccineto-Callunetum hepaticosum*, the areas of H21a that lack the hepatic mat, and ascribe the impoverishment to burning. Broadening the *Vaccineto-Callunetum hepaticosum* concept to allow inclusion of all impoverished versions nationwide, makes it is easier to see that impoverishment might also be climatic, at least in the case of the English examples. Despite occurring on exactly the sort of topography needed to maintain relatively high levels of humidity required by H21 (slopes of $35\text{-}50^0$ and an aspect ranging between north north-west and north-east at an altitude of between 320 – 360m), ultimately, the differences in rainfall between the Long Mynd (averaging 900-950mm of rain a year) and north-west Scotland (averaging 1600-3200mm of rain per year) mean the Long Mynd and most other English sites are just not wet enough to support most of the oceanic liverwort species that comprise the hepatic mat. They are only wet enough to support the suite of calcifugous damp-loving heath and oak-wood moss species.

Most of the species that make up the hepatic mat have not been recorded from anywhere in the UK outside of north-west Scotland, or if they have it's as occasional records from the wettest parts of the Lake District and Snowdonia. The more widespread exceptions that occur in upland Shropshire are *Diplophyllum albicans* and *Scapania gracilis*. In the table below I've colour-coded McVean's and Ratcliffe's species list to show which species are only found in Scotland; which are found in Scotland, Snowdonia and the Lakes and which are more widespread. I think the Long Mynd's bryophyte flora has been very well recorded by many notable bryologists, but it is silly to hope that these steep north-facing slopes might harbour some more notable species of the hepatic mat - If not now, then maybe in the future if climate change gives us a consistently wetter climate (which it probably won't)? Away from bryophytes *Listera cordata* and *Hymophyllum wilsonii* occur in McVean and Ratcliffe's *Vaccineto-Callunetum hepaticosum*. Could they occur in the Long Mynd's H21a?

Perhaps broadening the definition and recognising the connection to *Vaccineto-Callunetum hepaticosum* might help us to decide how these slopes are to be managed in the future. I'm not sure how well liverworts spread but if the climate did become consistently wetter would the areas of what are now H21a allow space for H21b and its hepatic mat to spread south and east? Or if the climate is to become more volatile would allowing succession to some sort of western oak wood (e.g. W17 *Quercus petraea - Betula pubescens - Dicranum majus* with which H21a seems to share a common moss flora) give the habitat more resilience?

As regards management in the present, McVean and Ratcliffe were convinced that burning destroyed the hepatic mat of their H21b community (to leave H21a). Nevertheless burning of H21a might not be sustainable either and should be avoided (as it is on the Long Mynd). Potentially chemical bracken management might also be damaging to the bryophyte mat of H21a. Research from University of Manchester (Rowntree et al., 2003) 'concluded that mosses suffer detrimental effects after exposure to Asulox at concentrations similar to those that affect fern gametophytes such as bracken'. Some of the mosses tested were those of the bryophyte mat: *Pleurozium schreberi, Thuidium tamariscinum, Polytrichum commune* and *Hypnum jutlandicum*.

Bryophytes have been well-recorded on the Long Mynd, but some more survey work would be useful on these H21a slopes to obtain a better record of the bryophyte (particularly the liverwort) flora. Lastly, the same community is likely to occur on the steep north-facing slopes of the Stiperstones. Further west but no wetter, the sub-community is also likely to be H21a.

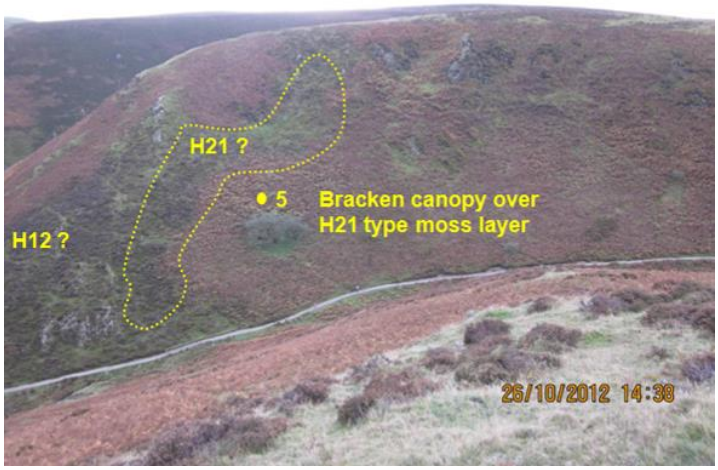

Fig 4. Carding Mill Valley

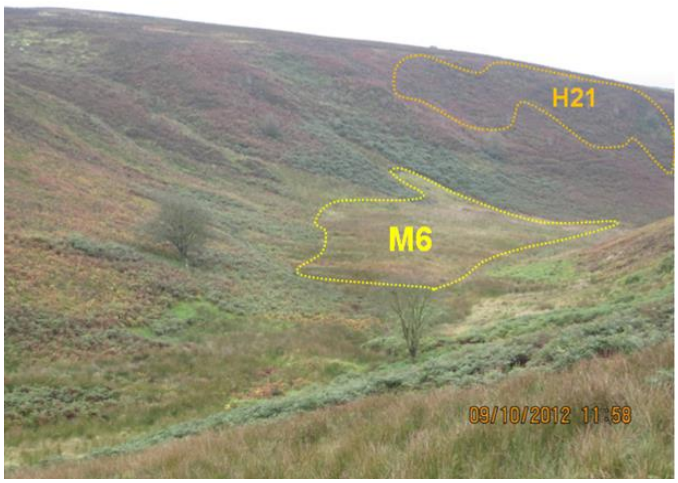

Fig 5. Bilbatch

Fig 6. Stands of H21 on the south-side of Lightspout hollow

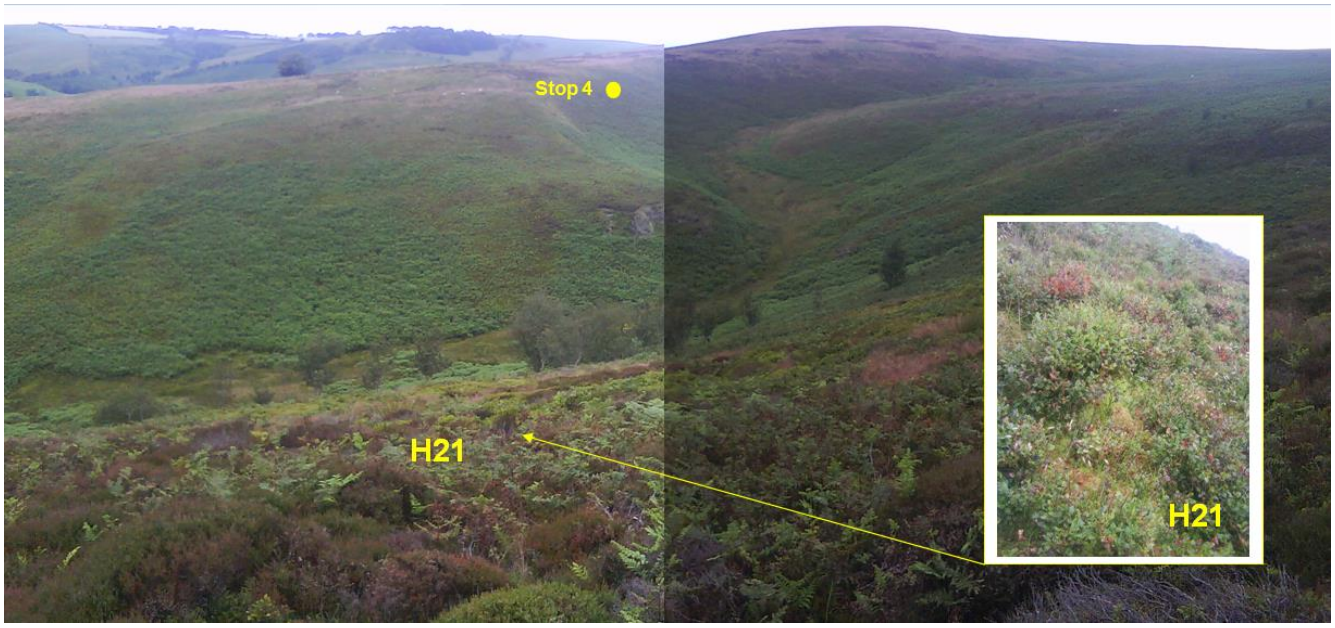

Fig 7. Catbatch - H21 in the foreground, mires in the valley bottom and Bracken dominated grassland and heath across the valley

Table 1: Similarities and differences between H21b and Rodwell's H21a and the H21a on the Long Mynd

Liverwort species colour coded to indicate their distribution - Red = Recorded only from NW Scotland; Orange = Mainly NW Scotland, but also occasional in the wettest parts of Snowdonia and Lake District; Yellow = not found on the Long Mynd but recorded from close by in Wales; Green = recorded on the Long Mynd.

	McVean and Ratcliffe's ***Vaccineto-Callunetum hepaticosum*** (syn. M21b) (11 quadrats)	Long Mynd Based on ten quadrats at SO43721 94857, SO4350495021, SO43367 95018, SO4338195309, SO41066 95291, SO41166 95281, SO41702 96668, SO41716 96643, SO41715 96622 & SO42690 95343	Rodwell's H21a
Calluna vulgaris	V	V	V
Empetrum hermaphroditum	V		
Vaccinium myrtillus	V	V	V
V. uliginsoum	II		
V. vitis-idaea	III		
Pteridium aquilinum		IV	III
Dryopteris dilatata		I	
Blechnum spicant	II	II	IV
Hymenophllum wilsonii	I		
Lycopodium selago	I		
Deschampsia flexuosa	V	V	V
Carex bigelowii	II		
Listera cordata	III		
Luzula sylvatica	II	I	II
Melampyrum pratense	IV		
Potentilla erecta	III	II	III
Solidago virgaurea	IV		
Oxalis acetosella		II	II
Dicranodontium uncinatum	IV		
D. majus	IV	II	IV
D. scoparium	IV	IV	IV
Hylocomium splendens	V	IV	IV
Hypnum cupressiformae	V	IV	IV
Plagiothecium undulatum	V	IV	V
Pleurozium schreberi	V	V	IV
Polytrichum alpinum	II		
P. commune		II	
Ptilium crista-castrensis	II		
Racomitrium lanuginosum	V		I
Rhytidiadelphus loreus	V	IV	IV
Rhytidiadelphus squarrosus		II	
S. capillifolium	V	II	III
S. subnitens	II	I	

S. quinquefarium	III	IV	
Thuidium tamariscinum	I		II
Anastrepta orcadensis	V		I
Anastrophyllum donnianum	IV		
Bazzania tricrenata	V		I
B. pearsonii	V		
Diplophyllum albicans	V		II
Herbertus aduncus	V		I
Plagiochila carringtonii	V		
Lepidozia pearsonii	III		
L. quinquedentata	III		
Mastigophora woodsii	V		I
Pleurozia purpurea	V		
Ptilidium ciliare	II		
Scapania gracilis	V		II
S. nimbosa	III		
S. ornithopodioides	V		
Mylia taylori	V		II
MATCH-derived similarity coefficents	H21b – 80%; H21 – 72%; H20c – 65%; H21a – 61%	**H21a – 68%;** H18a – 64%; W17d – 60%; W18e – 59%	

References

McVean D.N. & Ratcliffe D.A. (1962) Plant Communities of the Scottish Highlands. Monographs of the Nature Conservancy No.1. HMSO, Edinburgh.

Rodwell, J.S. (ed.) (1991). British Plant Communities. Volume 2. Mires and heath. Cambridge University Press.

Rowntree, J. K., Lawton, K.F., Rumsey, F. J. and Sheffield, E. (2003) Exposure to Asulox Inhibits the Growth of Mosses, Ann Bot (2003) 92 (4): 547-556. August 21, 2003.

Hybrids and Pollen Fertility

Martin Godfrey

Introduction

Even though I am writing this at the end of January, signs of spring flowering are all around with expanding Hazel Catkins and the first Snowdrops and even the odd Primrose so we can look forward to the start of the botanising season. In fact given Tim Rich's BSBI New Year flowering plant count does it ever really end?

Once we get out into the field one of the things that we tend to shy away from is trying to identify and record hybrids. Although they have a reputation for being "difficult" and their identification a bit of a black art they can be very common and well worth looking out for as they can tell you some interesting things about the dynamics of the local flora.

It is true that in practice hybrids can be quite tricky and keys not always all that helpful however there is an aspect of hybrid biology which can help. Very often the pollen of hybrid flowers is infertile and the purpose of this article is to show you how to look at pollen and test its fertility.

How it works

In hybrid plants the chromosome numbers of the two parents may not be the same, or the individual chromosomes may not match, which will result in the cell division which produces the pollen in the anthers of the hybrid not working properly. This means that some, or all, of the pollen will lack living contents and the grains being collapsed and distorted. We can exploit this fact by staining the pollen with something which will only be taken up by living material and examining the result under a microscope.

What to do

The technique is really very simple. Put a drop of the stain aceto-carmine on a microscope slide and squash an anther in it with a pair of forceps to release the pollen. Remove the larger remains of the anther leaving just the pollen, cover with a cover slip and observe. If the pollen is fertile most or all of it will have taken up the stain and will appear coloured and fully formed under the microscope (see Fig 1). In infertile pollen most or all of it will be unstained and many of the grains will be shrunken and distorted (see Fig 2).

Some pollen can take a while to stain so if the pollen hasn't taken up the stain when you first look at it leave it for a while or gently warm the slide. This will encourage the uptake of the stain.

As an alternative to aceto-carmine you can get the same results by using lactophenol-cotton blue stain. You can buy both stains from Brunel Microscopes at:-
http://www.brunelmicroscopes.co.uk

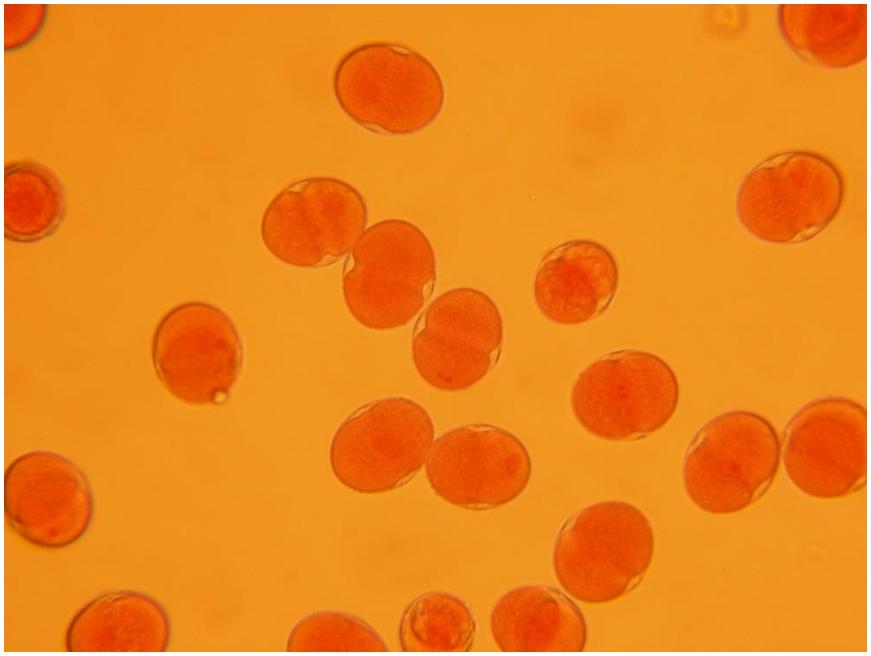

Fig 1. Fertile *Symphytum orientale* pollen

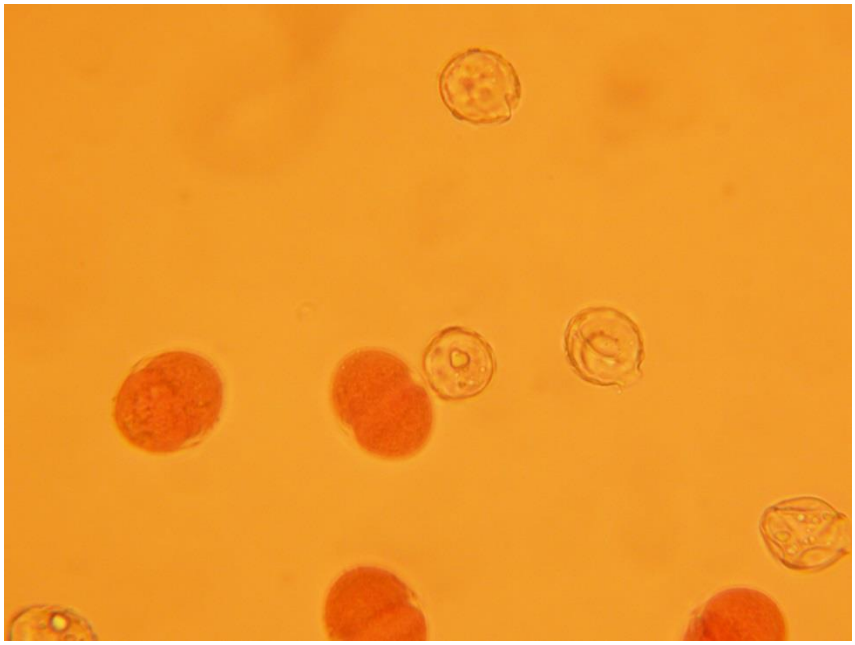

Fig 2. Partially infertile *Symphytum x norvicense* hybrid pollen. (Note pale stain in the fertile grains and the distorted unstained infertile grains)

The genus *Sphagnum* A Guide Part 4: Small red *Sphagna.*

Martin Godfrey

Introduction

In this fourth part of my overview of the genus *Sphagnum* I will provide notes on three small red species, as well as two subspecies – *S. capillifolium* (in the form of its two subspecies ssp *capillifolium* and ssp *rubellum*), *S. subnitens* and *S. quinquefarium*. These are by no means comprise all of the red *Sphagna*, indeed we have already looked at *S. magellanicum* in part two of the series, but they are the common species likely to be found when out botanising in Shropshire. Note that with all these species in shady conditions, such as partially under heather, the plants may be greener than red but close examination will usually reveal at least some pigment.

General

All three of these species are in section *Acutifolia* of the genus *Sphagnum.* This section is characterised by a slender habit, the frequent presence of at least some red pigment, spreading and pendent branches being strongly differentiated (the pendent usually being long, slender and rather pale or even whitish in colour) and stem leaves which are upright, see Fig 1.

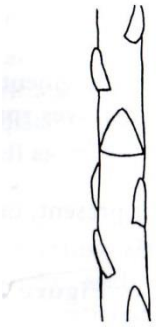

Fig 1. Upright stem leaves.

The morphology of branch fascicles and the size and shape of the stem leaves is going to be important in distinguishing between these species so you will need to do the simple field dissection outlined in part 1 of the series to give you a small selection of intact fascicles and a bare stem on which you can see the upright stem leaves. Remember that the structure of fascicles can vary, even within a single specimen, so it is important to look at several to decide what is typical. In distinguishing the two subspecies of *S. capillifolium* you will be asked to measure the length of the stem leaves – this may seem impractical in the field but is, in fact, quite easy if you use one of the lenses which incorporate a mm measuring scale (well worth having for more general botany for measuring floral parts) – BSBI/Summerfield Books does a couple of models.

Sphagnum capillifolium

This wine-red species forms compact hummocks or rather more spreading mats (see below) on damp moors and in bogs, Fig 2. The stem leaves are ligulate, with more or less parallel sides, tapering at the end to give either a pointed or a rounded tip (see below). In this species the branch fascicles usually have four components, two spreading and two pendent. It is divided into two subspecies (in many Continental accounts these are given specific status; on the other hand there are some bryologists who are sceptical of their existence at all as separate taxa) and it is well worth looking at these in detail and recording them as we don't have a clear understanding of their distribution.

Fig 2. *S. capillifolium*

Subspecies *capillifolium*
This subspecies forms tight, dense, mounds which feel firm to the touch and the capitula are distinctly pom-pom shaped, Fig 3. The stem leaves have pointed (maybe even somewhat pinched) tips and are typically greater than 1.2 mm long.

Subspecies *rubellum*
This subspecies forms rather loose mats and has a flatter, rather untidy looking, capitulum, Fig 4. The stem leaves have a rounded tip and are typically less than 1.2 mm long. It may be found in somewhat dryer habitats than ssp. c*apillifolium.*
In practice I find that the stem leaf length is a pretty reliable ID feature, the mound vs. mat growth form quite reliable and the capitulum shape less so. It is best to split the subspecies on as many features as possible.

Fig 3. Ssp. *capillifolium*

Fig 4. Ssp. *rubellum* (Both photos – Des Callaghan)

Sphagnum subnitens
In our part of Britain this species frequents a number of wet habitats including flushes, heath and woodland edge and is less likely to be found in bogs. It grows in small soft mounds and cushions. The colour is more usually a salmon pink rather than wine red, in practice once seen it is quite distinctive. The capitula often have rather greenish centres with the red colour confined to the edges which make this species stand out in the field (but beware less typical examples of the following species), Fig 5. The plant derives its specific name from the shiny character of the dry plants.

Fig. 5. *S. subnitens.*

The stem leaves are triangular and frequently have acute tips with inrolled margins. The branch fascicles usually have three members, two spreading and one pendent, Fig 6.

Fig 6. *S. subnitens* fascicle.

Sphagnum quinquefarium

I have included this species because although it is usually more or less green throughout it can occasionally be quite red with a capitulum which may mimic that of *S. subnitens* to a casual glance. It also grows in similar habitats to the latter species although always on well drained ground and is absent from bogs and flushes – I find it quite frequently in wet woods. In growth form it produces often quite large, soft, hummocks and carpets, Fig 7.

Fig. 7 *S. quinquefarium.*

The stem leaves are distinctly triangular but what makes it really stand out is its branch fascicle. This has five components - three spreading (the other members of sect *Acutifolia* have two) and two pendent, Fig 8.

Fig 8. *S. quinquefarium* fascicle.

Using Floral Formulae

John Handley

Floral formulae have two main practical uses. First, when keying out a plant it is most efficient to fully observe a flower's structure, prepare a floral formula, and then progress to keying out. Almost all the features denoted in a floral formula will be used in the identification process just to get to family level. This is more efficient than returning to the specimen to re-examine it as each new pair of questions is encountered. Second, comparing the floral formulae of a variety of species in a family is an excellent way to find the main features of a family and the areas of variation and to start to recognise and identify families. Floral formulae recognise that all angiosperms develop sequentially from the base to the apex. In its application we distinguish the specific organs as they occur, their number, symmetry, position – relative to one another, degree of fusion to one another, as well as loss or suppression of organs.

This is a technique that was first used by Cassel (1820) and has been used together with floral diagrams to help us understand the structure and development of flowering plants. Although it is a technique which has fallen a little out of use, I suspect with the demise of botany lessons within school, the format was bought back up to date by Prenner *et al.* (2010) and may function as a phenotypic counterpart to the DNA barcode.

A typical floral formula is composed of 5 parts;

1. An assessment of the symmetry of the flower (table 1), though Prenner *et al.* recognise that the symmetry of each organ can be stated.
2. Number of sepals, collectively referred to as the calyx. This is assigned the capital letter ‘K’.
3. Number of petals, collectively known as the corolla. This is assigned the capital letter ‘C’.
4. Number of stamens, collectively the Androecium, literally the home of the male. This is given the capital letter ‘A’.
5. Number of carpels, collectively the gynoecium, literally the home of the female. This is ascribed the capital letter ‘G’.

Table 1. Characters used within the in floral formulae, adapted from Prenner *et al*.

Character	Description
Symmetry	
↓	Median monosymmetry or zygomorphy, capable of being cut in only one plane in the median direction so that the two halves are mirror images. Unicode: 2193 Alt + x
┼	Disymmetry, possessing two planes of symmetry Unicode: 253C Alt x
*	Polysymmetry or actinomorphy, radially symmetrical with 2 or more planes
Organs	
K	Calyx (number of sepals)
C	Corolla (number of petals)
P	Perigon (number of tepals)
A	Androecium (number of stamen)
G	Gynoecium (number of carpels)

G	Gynoecium superior ovary (number of ovules per ovary)
-G-	Gynoecium half-inferior ovary (number of ovules per ovary)
Ĝ	Gynoecium inferior ovary (number of ovules per ovary) Unicode: 011C + Alt x
Others	
∞	"many" organs (i.e., >12) (infinity) Unicode: 221E + Alt x
(x), [x], {x}	Fusion of different organs (different kinds of bracket allow for a nested series of up to three levels of fused organs)
♀	♀ female (pistillate) flower Unicode: 2640 + Alt x
♂	♂ male (staminate) flower Unicode: 2642 + Alt x

Where there is no separation into calyx and corolla the letter P is used to describe the tepals. Each letter is followed by one or more figures showing the number of parts comprising each organ or whorl, e.g. A5 indicates that the flower has 5 stamens, while A5 + 5 signifies that there are two whorls of stamens comprised of 5 in each whorl. Where the number of parts is large or imprecise the sign '∞' denoting infinity is used

Fusion within and between organs is noted through the use of brackets e.g. five separate sepals may be fused to 5 fused petals: (K5 C[5]). Where organs are not fused they are described as being 'free'.

A longitudinal cross section can help establish the point of attachment of the ovary; if the sepals, petals and stamens, or their united bases (floral tube), arise from below the ovary it is superior, hypogynous, this is indicated with a line underneath 'G'. In an inferior ovary, epigynous, the sepals, petals and stamens, or their united bases (floral tube), are attached to the top of the ovary, signified as 'Ĝ', Figure 1.

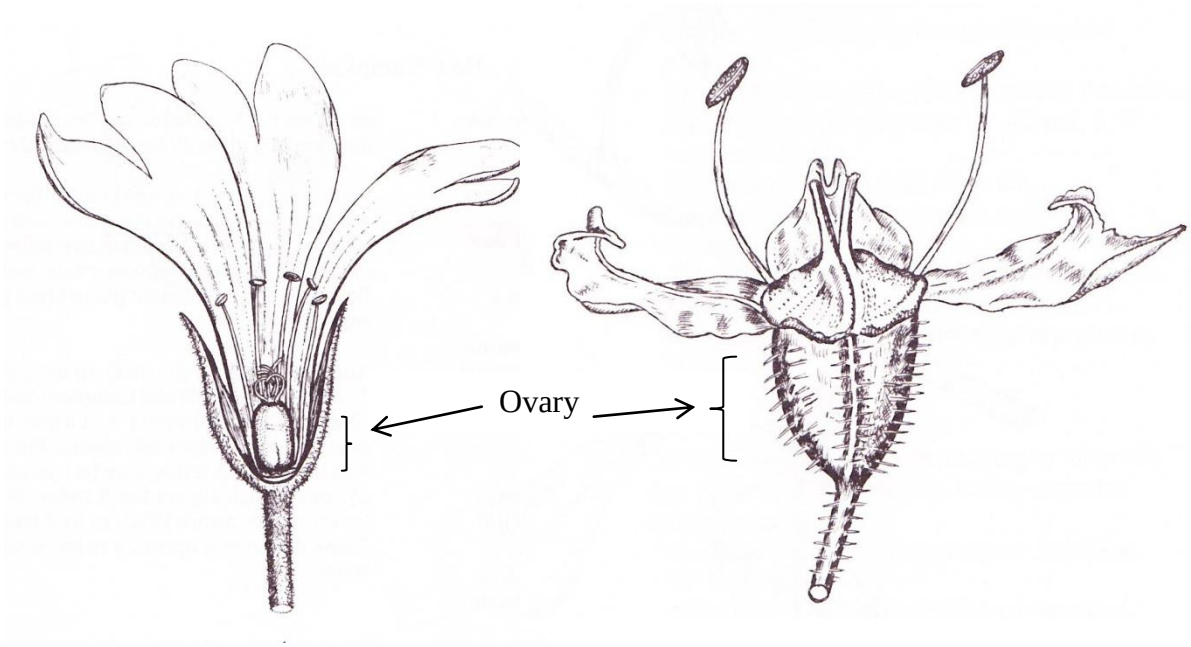

Fig 1. Longitudinal section through *Cerastium tormentosum* and *Heracleum sphondylium* flowers illustrating a superior and inferior ovary respectively. Adapted from Hickey and King (1997).

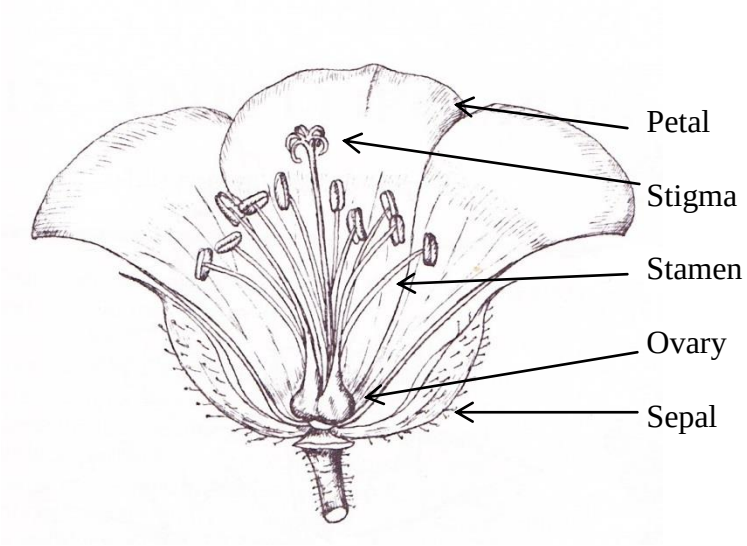

Fig 2. Longitudinal section through *Geranium pratense* showing 3 of the 5 free petals, the separate stamens widen out at the base to form a cup-like structure round the ovary. Adapted from Hickey and King, (1997).

An example of a floral formula for *Geranium pratense*, Meadow Crane's-bill, would be:

*K5 C5 A5+5 G(5)

The formula describes the flower thus: A radially symmetric flower composed of 5 free sepals, 5 free petals, two whorls of 5 free stamens surrounding a superior ovary composed of 5 fused carpels (Figure 2).

The floral formula is very useful shorthand which is continuing to be useful in an era when our understanding of morphology improves with developments in genetic techniques. Such a useful and simple method may continue to stand the test of time.

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Clarepool Moss SSSI, SAC - Site Update

Mags Cousins

A profile of Clarepool Moss SSSI was given in the Autumn 2008 newsletter. This followed significant tree felling off the bog by English Nature (now Natural England) and subsequent treatment of birch regeneration for several years afterwards, to conserve the schwingmoor or quaking bog. The importance of this basin mire has been well documented historically and it has a plethora of well justified designations, SSSI, NCR Grade 1, SAC and Ramsar site.

Despite this legislation, the site remains vulnerable to nutrient enrichment from diffuse water pollution; it is liable to succession and the plant communities are influenced by changes in the hydrology due to the artificial drainage systems. The presence of an extensive drainage network has long been a concern and some plastic sheeting was installed by English Nature in the ring ditch and on the main outlet following the tree clearance in 2005. This went some way to slowing the rate of water loss from the site but much of the surface of the site remained dry and was particularly vulnerable to birch regeneration. The old peat digging pits were moist in the deepest areas, the dystrophic pool retained water and the quaking bog still quaked at its heart, but concern remained that there was insufficient water to retain the whole basin mire system. By chance an opportunity arose to see what happens when the main outlet drain becomes blocked as this is exactly what happened in late winter 2013.

On approaching the site in June 2013, numerous Black Headed Gulls, Lapwing, Mallard and Canada Geese could be heard. Despite these heralds of wet conditions it was still surprising, on reaching the site to see water covering the majority of the site and to a depth of 1m, possibly deeper in places! The main drain taking water from the site and surrounding fields had become unintentionally blocked underground and it was remarkable how much water had accumulated on Clarepool Moss over just two months. 100's of gulls were nesting on the dead bits of birch (sprayed two years previously) which were sticking out above the water. This was certainly a safe haven for rearing their chicks as the site was too treacherous to attempt to cross it, as the tannin stained deep water hid all manner of dead wood trip hazards from previous clearance and stepping into an old peat pits would have meant a swim.

This ability of the site to collect water was a stark reminder of how the site came to be a mire in the first place, but was an inundation of such a large quantity of surface runoff of unknown water quality actually beneficial? Charles Sinker speculated that the site had been lowered by a metre or more due to drainage and peat cutting, and if so, the original hydrology will never be restored exactly as it was. The interesting question was, had the areas of high quality quaking bog, with *Sphagnum magellanicum*, *Drosera rotundifolia* Round-leaved Sundew, *Vaccinium oxycoccus* Cranberry and *Andromeda polifolia* Bog Rosemary, been covered with surface water runoff, or were they floating?.

A proper investigation had to wait until August when the water levels had dropped by about 20cm. From a distance it appeared that not all the site was submerged as the white tufts of *Eriophorum vaginatum* Hare's-tail Cottongrass could still be seen. On wading across to the schwingmoor, the tide line of *Lemna minor* where the surface water had receded was clearly visible on the edge of the quaking bog. The surface of the quaking bog remained clean and fresh so it was assumed it had indeed floated up with rising water levels. Alternatively, as in a raised bog, the surface of the mire maybe domed above the surroundings due to peat accumulation. Analysis of the LIDAR (Laser remote sensing) land level data flown last year

will tell us more. It was encouraging to see that abundant *Sphagnum fallax* was growing out from the edge of the mire into the water and in other hollows across the site indicating good prospects for peat bog recovery.

The accidental blockage freed itself some weeks later with water levels dropping significantly at the adjacent Towery Moss, but levels remained high on Clarepool Moss so it was assumed there was a second blockage in the drain nearer to the SSSI. Automatic water level data loggers have been installed on Clarepool Moss to monitor water levels and there are plans to fix controllable water level structures on the drains to retain at least some of the water that used to exit the site. Raising water levels will allow an expansion of active peat growth even if this means that some of the site will actually have to be inundated. Higher water levels could mean a loss of some of the dwarf shrub heath that was starting to recover where birch had been removed, but this was a hard won vegetation type and not really sustainable in the long run due to the continual battle with Birch regeneration on a site that would be extremely difficult to graze. The priority is restoring a basin mire system with active peat formation and this is only likely to be possible by raising water levels surrounding the quaking bog. It will be interesting to see what type of wetland community is able to develop in the newly wetted up areas.

Clarepool Moss SSSI, June 2013, photo by Mags Cousins

The Ramblings of a Shropshire Naturalist EA Wilson

Mags Cousins

Here is another series of extracts from the writings of Edward Wilson, this time about his visits to Clarepool Moss. Edward was a keen naturalist who took detailed and useful notes of his field excursions in Shropshire and which can be seen at Shropshire Archives in Shrewsbury. His accounts of sites of over 60 years ago often provide insights for managers of those sites today.

18th April 1951

Just over two miles from Ellesmere there is a wooded bog complex with a pool close to its eastern edge, known as Clarepool Moss. It can be reached from the Ellesmere-Whitchurch road quite easily as it is only separated from the road by one field; or from the other side along the Lyneal road, although it is somewhat further from the road and not so easy to detect.

It is not often visited so that it is an interesting area to study. On our way to it we saw a pale yellow butterfly which had somewhat bleached orange spots, one on each wing, characteristic of the female Brimstone Butterfly (*Gonepteryx rhamni*), this male being a rich sulphur yellow in colour with deeper orange spots.

We soon saw the familiar birch trees of the moss habitat, and after crossing the boundary ditch entered a wood. A number of the birch trees were attacked by the bracket fungus (*Polyporus betulinus*). This forms fruit annually, being brown and scaly above and having a multitude of spores (Polyporus means 'many spores'). These tubes are lined by spore-producing cells; the spores horizontally for a distance which equals the radius of the tube before rising vertically; on reaching the mouth of the tube the spores are carried away by air currents. As the chances of the spores landing in a suitable environment are rather remote, millions of spores are produced by one of these bracket fructifications. Several times I have noticed small, pale brown mites crawling over the spores, but have been unable to find out which mite it is.

After a time the character of the ground changed quite rapidly and we came across ling and cross-leaved heather, pine trees and much Sphagnum, and some patches of the moss, *Polytrichum commune*. A fallen tree trunk was brilliantly decorated with thousands of capsules of the moss *Dicranella heteromalla*, while a small tree stump was the habitat *Tetraphis pellucide* which has stalked gemma cups.

We saw a carter drive out from the Moss with a large load of brushwood as we came to drive through the Moss, with a pinewood on our left where the pines were planted in close array on rising ground. At the end of this wooded portion there was a well-built hut made from pinewood uprights, roofed with corrugated iron, but what interested us most were the sides, which were made of two layers of wire netting, one or either side of the pinewood uprights, stuffed with dead bracken. A wooden seat formed of planking went round three sides of the hut, and there was a well-made table in the centre. The front was completely open. We noticed three young rabbits hanging up, and another on the table; on the floor by the entrance there was a collection of mole traps and wire rabbit snares. Nearby was s 'gamekeeper's gibbet' from which

hung a newly killed stoat - this was interesting as we met with partially eaten carcases of rabbit and a wood pigeon on our wandering?

From this point we walked at right angles to our previous direction through more birch trees and bushes with bracken undergrowth until we reached the edge of the Moss in this direction. Making our way slightly inwards once more we came across an area quite different in character from any we had met so far. It consisted of wiry ling bushes with extensive Sphagnum covered pools, often interconnected. The pools were completely covered by Sphagnum, their vivid green colour contrasting strongly with the dull grey-brown of the ling. A rabbit suddenly shot across one of these pools at great speed, its light weight allowing it to do this without any risk of sinking. There was a considerable quantity of a highly branched green-grey lichen, *Cladonia impexa*, whose appearance resembled a plastic 'pan-scrub'.

Suddenly we caught sight of open water. This was obviously the 'clear pool' (Clarepool) from which the Moss took its name. For some distance from the pool the ground was so boggy, with a carpet of Sphagnum that it was difficult to get near to the edge of the pool. However we finally did get there and before us stretched a considerable lake. The water was brown, and pH papers gave a reading of pH4, with much fringing vegetation, almost the only plants present being quite large, almost floating, tussocks of the Paniculate Sedge (*Carex paniculata*) with some Marsh Cinquefoil (*Potentilla palustris*).

25th May 1960

On another occasion I took the College Field Club to Clarepool Moss. Soon after entering the Moss we found ourselves walking on dead bracken litter. This dry covering was the home of innumerable spiders which scattered before us as we walked forward. Many of them were females carrying their eggs at the back, wrapped up in white, cobweb-like material. One of the boys brought some of these spiders back to school and tried out various experiments on them. He found he could exchange egg-bags from one spider to another; could take away their eggs and offer them pellets of various materials of about the same size and shape, such as pellets of bread, or pieces of cork, all of which were accepted. These 'wolf spiders' do not spin web snares, but chase their prey and catch them by leaping on them.

One spider we caught looked extremely like an ant, both in shape and size, so that it was probably a case of mimicry, where the spider gained some protection from the resemblance. Later we found a Raft Spider (*Dolomeds fimbriatus*) moving with great agility on the surface of the water in one of the ditches by means of its long, flattened legs.

After passing open ground with some magnificent hawthorn trees in full bloom; bluebells; comfrey; red campion and forget-me-not; Scots Pines became increasingly more plentiful. Somewhere in the trees a Chiffchaff kept up his repetitive song.

Suddenly we came upon a large area entirely covered by Sphagnum moss. It's colour varied from white to yellowish-green but there was a pink tinge where the tiny lily-like flowers of the Cranberry (*Qxycoccus palustris*) grew on the Sphagnum; there were also a few tufts of Cotton Grass (*Eriophorum vaginatum*). The surface was almost level and very soft and yielding to walk on, in fact, it heaved up and down in a most alarming fashion when we tried walking on it near to its edge. When Ridgway

tried to pound the bottom by sinking three net-rods screwed together through the Sphagnum cover, there was hardly any resistance beneath. In fact, the whole area was really a, ‘kettle hole’ containing water, whose surface was completely covered by a tough layer of *Sphagnum*, the botanist refers to these areas as 'quaking bogs'

Back on firmer ground we continued our search for the pool. Ridgway sampled one of the boundary ditches and obtained an abundance of waterfleas, with a few gnat larvae, damsel fly nymphs, water boatmen and water beetle larvae. Later examination of the catch showed some large waterfleas, 3-5mm long, all of which were Daphnia obtuse. They had a surprisingly large number of eggs in their brood pouches - I counted 28 in one individual and 30 in another. Another interesting feature was that most of them were red in colour, due to the possession of haemoglobin. This pigment is similar to the haemoglobin in our own blood but is used to store oxygen and deal it out slowly owing to the poorly aerated conditions. There were multitudes of the tiny waterfleas *Chydorus sphaerlous*.

There was much ling about, although not yet in flower, its wiry stems being completely covered by the grey, crinkled dead-looking lichen *Parmelia physodes*. A lizard was seen but escaped capture.

At long last we found the Pool and sampled the area for water life and plant life.

28 May l960

My wife and I paid a visit to the Moss, entering it from the Lyneal read end. We soon found the pool this time but it was with some difficulty that we approached it owing to the spongy, boggy nature of the ground, which had much Round-leaved sundew (*Drosera rotundifolia*) on it besides Sphagnum, Cranberry and Cotton Grass. I managed to get a photograph but had to keep moving my position as my feet began to sink several inches in a matter of minutes, the vegetation near to the edge of the pool being virtually afloat.

In the meantime my wife had caught a Cardinal Beetle (*Pyrochroa coccinea*) and had been watching it using its legs to ‘preen’ itself after getting wet. I was interested to notice that it had a black head, as the Field Club had found a red headed specimen at Crosemere a fortnight before. There are three species of Cardinal Beetle in Britain, all having a brilliant scarlet livery.

1st June 1960

I took Ridgway and Turner, two members of the Field Club, to try to find out the depth of the Pool and of the ‘Quaking Bog’. To do this we took a set of sweep's canes, each of which was one yard long. Bottom was reached in the Pool, close to its edge, at a depth of 27 feet; while we failed to reach bottom at a depth of 30 feet in the Quaking Bog. Using a B.D.H. Comparator we did a fairly accurate determination of the pH value of the water. Neutrality is indicated by pH=7, but we found a pH of 6 in the Pool, and of 4 in the Quaking Bog. The decreasing numbers indicated increasing acidity.

Amongst the Pine trees on the somewhat drier ground we came across a fine specimen of the moss, *Leucobryum glaucum*, the name *Leucobryum* means 'white moss', and in dry weather it is almost white. It forms large, tight cushions, and our specimen was

about eight inches across, and hemispherical in shape. If the moss is split open it will he seen that only the peripheral layers are green, the rest of the moss being dirty white in colour. Like Sphagnum it has leaves which can take up water, so that the whole interior of the clump retains water by capillarity, and can survive drought conditions. Sometimes clumps become spherical and as large as footballs, becoming detached and rolling about in the wind.

On another occasion we found two plants of the Royal Fern (*Osmunda regalis*) just to the east of the pool. It is quite a rare occurrence to find this fine plant growing in the wild, although it is not uncommon in gardens. It has large leaves, but these do not bear any spores, as there are, separate spore-bearing fronds.

Membership is **£15 a year or £30 for three years** and is due for renewal on January 1st of the year shown. Please send cheques made out to *Shropshire Botanical Society*, to Mark Duffell 19 Compton Mews, Ford, Shrewsbury, SY5 9NX. If your name is in bold this draws attention to the fact that your renewal is due and this will be your last newsletter (*Correct as of 1st February 2014*, apologies if you have already sent payment in the mean time).

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Sue Swales, Shrewsbury	2016
Sue Swindells, Oswestry	2016
Ian Thompson, Shrewsbury	2017
Jo Thompson, Shrewsbury	2016

John Thompson, Harmer Hill	(hon.)
Kate Thorne, Church Pulverbatch	2016
Rosemary Thornes, Shrewsbury	**2014**
Mary Thornton, Oswestry	2016
Bob Thurston, Upton Magna	2015
Sue Townsend, Shrawardine	2016
Ian Trueman, Wolverhampton	(life)
Jenny Vanderhook, Cleobury Mortimer	**2014**
Chris Walker, Condover	(life)
Tom Wall, Lydbury North	2015
Hilary Wallace, Hereford	2015
Neville Walters, Stoke on Trent	**2014**
Sarah Whild, Shrewsbury	2016
Gillian Wilson, Pontesbury	2016
Dan Wrench, Shrewsbury	2016
Penny Wysome, Wellington	2016